

**WESTON
MODEL 1092
SENSITROL® RELAY**

**OPERATING AND
APPLICATION MANUAL**



WESTON INSTRUMENTS, DIVISION OF DAYSTROM, INCORPORATED
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GENERAL DESCRIPTION

The Weston Model 1092 SENSITROL[®] Relay is a magnetic contact type relay designed for continuous use. This relay has an adjustable operating range of approximately 0 to 50 μ A, or 0-100 MV. Repeatability is 1% of full scale. Expected accuracy depends upon how accurate the operator is in setting up the relay. A self-contained electromagnetic reset, designed to operate on 120V AC or 48V DC, is a feature which adds to the versatility of this device. In addition, the Model 1092 can be set to make contact on either increasing or decreasing current values, merely by changing the polarity at the input. Minimum current required to operate this relay is approximately 5 μ A.

Setting the relay to the desired making point is accomplished by turning the operating point adjusting screw. *NOTE: Do not rotate continually in one direction.* To assist in making an accurate contact setting, an auxiliary indicating microammeter can be connected in series with the relay input terminals. After the desired operating point has been found, the microammeter may be removed. Figure 1 shows a microammeter connected to the input terminals of the relay, and the location of the operating point adjusting screw used in setting the operating point.

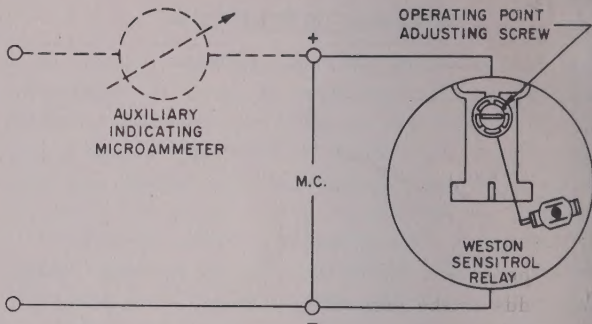


Figure 1. Setting the operating point of the Model 1092.

MOUNTING

Three 0.125 inch diameter holes spaced 120° center to center around the case flange provide the means for panel mounting. The Model 1092 can be mounted in either the vertical or horizontal position, however, when going from one position to the other, recheck the operating point setting. A slight change in the setting may be necessary when changing the operating position because of a variation in the relay's mechanical balance between these two positions. Figure 2 shows the necessary mounting dimensions.

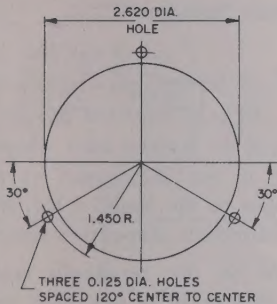


Figure 2. Model 1092
Mounting Dimensions

OPERATION

Figure 3 is the internal wiring diagram for the Model 1092. Its simplified core magnet design is exclusive with Weston.

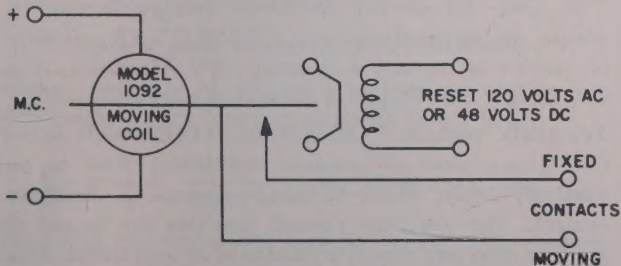
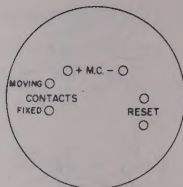


Figure 3. Model 1092 Internal Wiring Diagram

Six external solder lug terminals, mounted on the base,

Figure 4. Model 1092

- Rear View



provide for easy connection to the Model 1092. Figure 4 shows these terminals and their respective markings.

DC potential is applied to the terminals marked, "+ M.C. -". Primarily, this relay is designed for DC operation, however, AC voltage can be applied to these terminals, provided a rectifier is connected across the relay (see Figure 7).

The 120V AC or 48V DC reset voltage is applied across the terminals marked, "RESET". This feature is convenient in that a common 120V AC outlet, or a 48V DC dry cell supply is all that is necessary.

Terminals marked, "CONTACTS, FIXED AND MOVING", are used to connect the Model 1092 to an auxiliary relay, which in turn, actuates an auxiliary control. The auxiliary control provides the means to start or stop any one of a multitude of operations. Use of auxiliary equipment may not be necessary, provided the voltage and current requirements do not exceed 120V and 100MA respectively.

BASIC USAGES

1. DC Voltage Relay

By adding a resistance, R_s , in series with the Model 1092, it can be used as a DC Voltage relay. Figure 5 illustrates this method of operation. For example, if the relay contact is set at 50 microamperes, and a

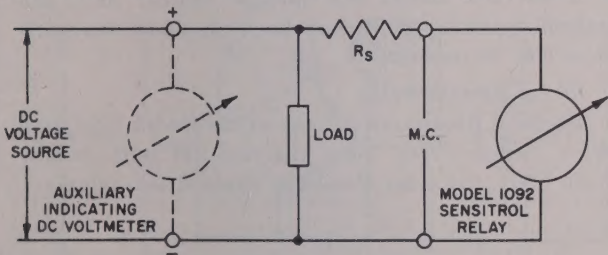


Figure 5. Model 1092 used as a DC Voltage Relay

voltage response of 100 volts is required, the series resistance, R_s , is found by applying Ohm's law.

$$R_o = \frac{V}{I} = \frac{100}{50 \times 10^{-6}} = 2 \times 10^6 \Omega \text{ or } 2,000,000 \Omega$$

The relay coil resistance may be neglected here since R_o is so much greater than the coil resistance of 2100 ohms $\pm 20\%$. However, for lower voltage ranges, the coil resistance should be considered and subtracted

from the overall resistance R_O to obtain R_S for optimum accuracy.

Here again, setting the relay to the desired making point is accomplished by adjusting the operating point adjusting screw. To assist in making an accurate contact setting, an auxiliary indicating voltmeter can be connected across the voltage source. After the desired operating point has been obtained, the voltmeter may be removed.

2. Direct Current Relay

Figure 6 illustrates the use of the Model 1092 as a direct current relay. Note that for use with current above $50\mu\text{A}$, the relay should be shunted accordingly.

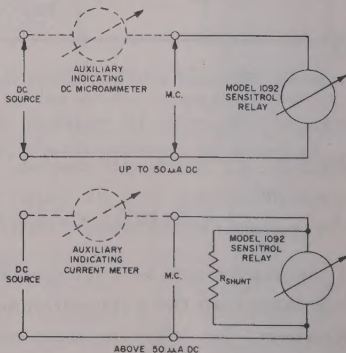


Figure 6. Model 1092 used as a Direct Current Relay

3. AC Voltage Relay

Figure 7 shows the Model 1092 used as an AC voltage relay. This is accomplished through the use of a Weston rectifier, P/N 89369, connected across the relay, together with a suitable resistance in series with the AC side of the rectifier. A setup similar to

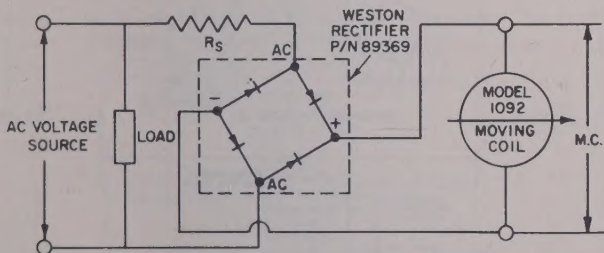


Figure 7. Model 1092 used as an AC Voltage Relay

the one used for the DC Voltmeter can be used in this instance, except of course, that AC standards should be used in determining the operating point.

4. Alternating Current Relay

Use of the Model 1092 as an alternating current relay is shown in Figure 8. To accomplish this, a Weston rectifier is connected across the relay. Contact

settings can be checked by connecting an auxiliary indicating instrument in series with the relay.

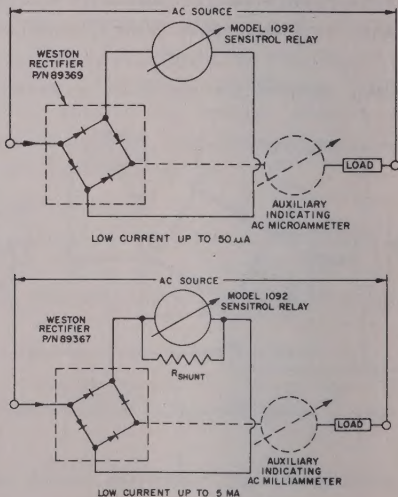


Figure 8. Model 1092 used as an Alternating Current Relay

5. Extended Range vs. use in DC Millivolt Circuits

To extend the basic range of the Model 1092, an external shunt can be connected across the relay input terminals. For example, as shown in Figure 9, if the

relay contact point is set at 50 microamperes, a 5 milliampere contact point can be obtained through the use of an external shunt of proper value. The correct value of the shunt can be found by Ohm's law.

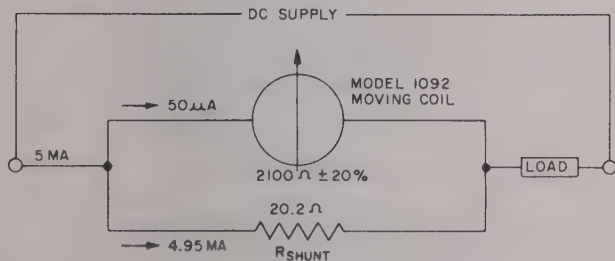


Figure 9. Model 1092 Extension of DC Range

$$I R \text{ drop} = .05 \times 2000 = 100 \text{ MV}$$

$$R_{\text{shunt}} = \frac{100 \text{ MV}}{4.95 \text{ MA}} = 20.2 \Omega$$

Through the use of the external shunt, the Model 1092 can be used in millivolt circuits. Control of currents in the neighborhood of amperes is possible by connecting a standard 50 or 100 millivolt external shunt across the relay input terminals, and setting the con-

tacts to the corresponding millivolt rating of the shunt. At this setting, the Model 1092 will obviously make contact at the nominal current rating of the shunt. Fractional values of the line current may be controlled by subsequent settings of the operating point adjusting screw.

6. *Extended Range vs. High Alternating Currents*

To extend the range for use with high alternating currents, a step down current transformer is used as shown in Figure 10.

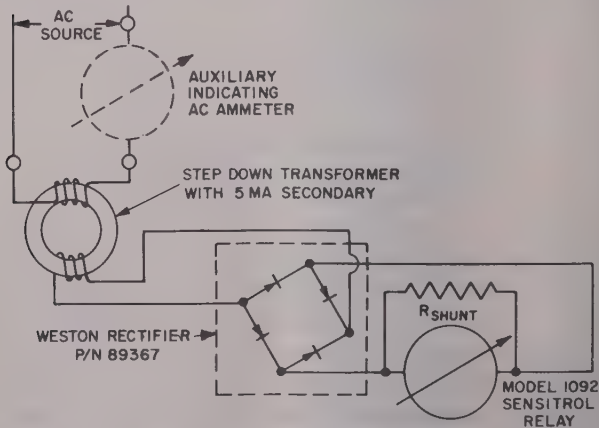


Figure 10. Model 1092. Extension of AC Range

APPLICATIONS

The wide range of adjustment on the Model 1092 allows for an infinite number of accurately repeatable settings by simply turning the operating point adjusting screw. Applications of this device are also infinite in number. A few typical applications are: radio activated alarm, electric door lock, radio control system for large vessels, door control and automatic buzzer.

TYPICAL CIRCUITS

1. Automatic High-Low Control (See Figure 11).

By utilizing two Model 1092 relays, and one auxiliary power relay in a "flip-flop" type circuit, such variables as temperature, speed, light intensity, etc. can be controlled between narrow limits. Either one or the other reset mechanisms will be energized through the auxiliary relay contacts, depending upon whether the "high" or "low" control has been actuated. At this point the condition reverses and is maintained until the other extreme of the control limit is reached. This control can be maintained between various limits depending on the setting of each of the relays.

By either connecting the Model 1092 relays as indicated, or reversing the polarities of both, the circuit

can be made fail-safe in either direction, depending on the individual application.

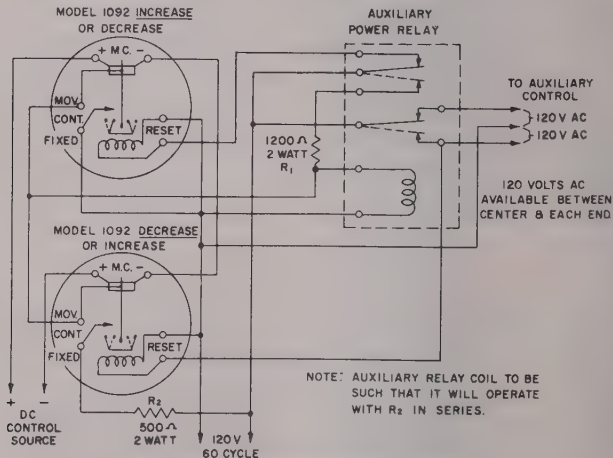


Figure 11. Automatic High-Low Control

2. Sensing Control Circuit (See Figure 12).

In situations which require longer periods of correction time than can be attained with a "pulsing" network, the above combination may be used.

The Model 1092 controls the power to the clock motor which in turn operates the two Microswitches alternately

by means of the eccentric cam. Correction occurs continually through the slave relay and is sensed every one-half revolution by resetting the Model 1092. If the relay contacts do not re-make, correction is discontinued and the clock motor stops when the normally closed Microswitch is opened. If the contacts re-make after being reset, correction continues (the normally closed Microswitch is short-circuited) for another one-half revolution of the cam.

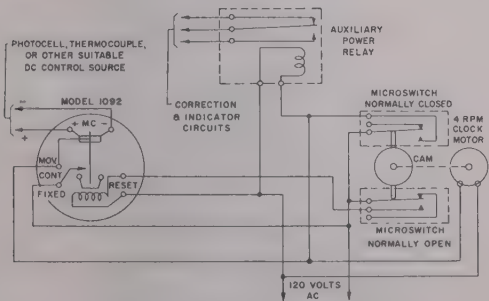


Figure 12. Sensing Control Circuit

3. Continuous Pulsing Control (See Figure 13).

The Model 1092 SENSITROL[®] Relay and an auxiliary power relay may be used to provide simple continuous pulsing control. The Model 1092 contacts energize the auxiliary relay coil which in turn pulses

the Model 1092 reset and also the correction circuit. This control requires the use of a DC auxiliary relay in order to allow a delay in the drop-out time by the use of a capacitor across its coil. This circuit is practical as an intermittent alarm or may be used in any situation which will be changed or corrected by short pulses of current such as maintaining temperature in liquids.

The circuit is self-compensating in that the pulse rate increases in proportion to the amount by which the control current exceeds the Model 1092 contact value, and decreases as the control point is reached, because of the corrective action. Pulsing discontinues when the control source is such that the Model 1092 does not make contact and remains in this condition until correction is again required.

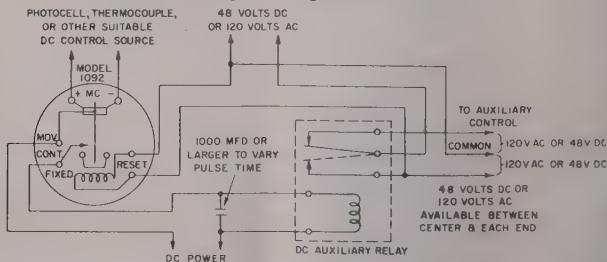
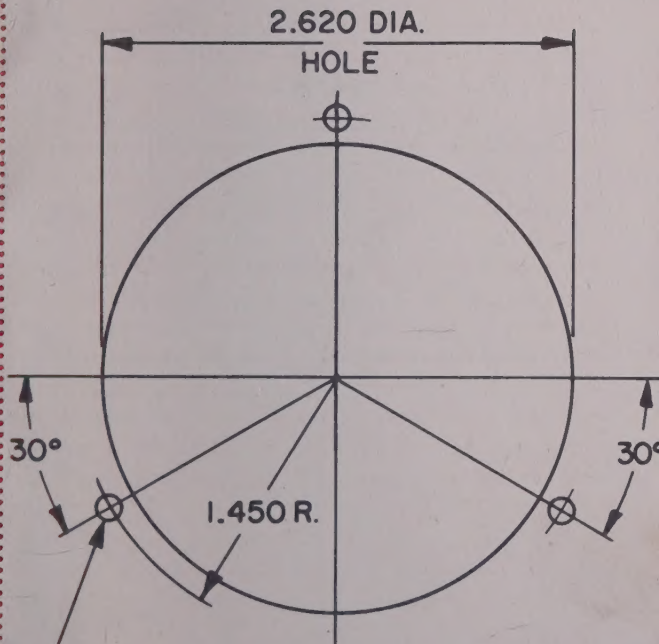
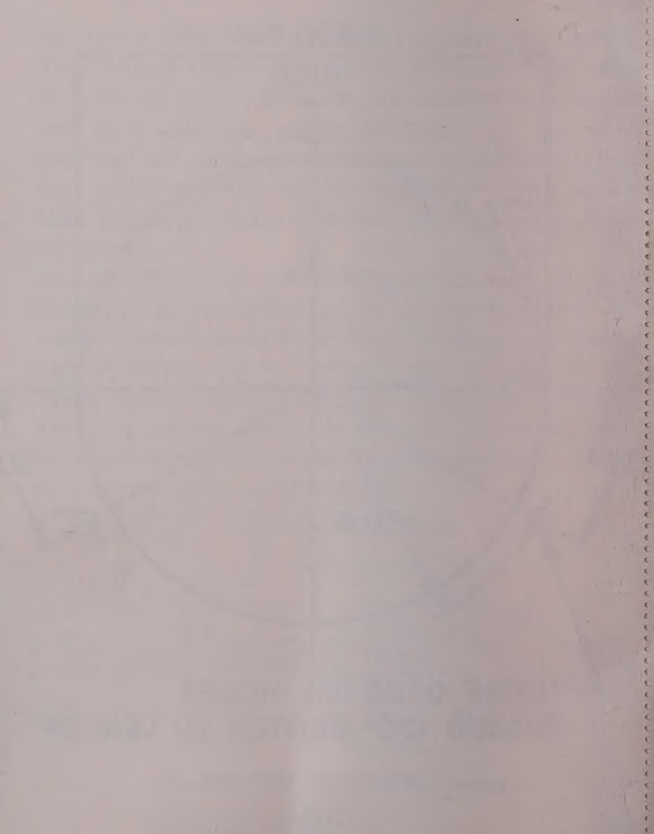


Figure 13. Continuous Pulsing Control



THREE 0.125 DIA. HOLES
SPACED 120° CENTER TO CENTER

MOUNTING TEMPLATE



WARRANTY

Weston products are warranted to be of good workmanship and quality and free from defects in manufacture. Our liability is limited to repairing such defects, provided they are returned prepaid to the Service Division, Weston Instruments, Division of Daystrom, Inc., 2350 Polk Street, Union, New Jersey, within one (1) year after delivery to the original purchaser. We shall not be liable for consequential damages. This warranty is in lieu of all other warranties, guaranties, liabilities or obligations, statutory or implied, to the original purchaser or to any other person.

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